

**REMARKS**

Reconsideration of this application is respectfully requested.

Claims 1, 10, and 21 are amended for clarification. Claim 1 has also been amended to incorporate the limitation of claim 2 regarding calcination time and temperature of amorphous titanium dioxide particles. Accordingly, claim 2 has been canceled. Upon entry of the amendments, claims 1 and 3-21 are pending and at issue. No new matter is added to the application.

***Objection to the Specification***

The Examiner has objected to the specification due to spelling, grammar and usage mistakes in the application and for the lack of registered trademark notations. The Examiner's work in identifying these errors is appreciated. Applicants submit herewith marked-up and clean copies of a Substitute Specification correcting these and other errors. It is believed that the bases for the objection have been addressed and overcome. Withdrawal of the objection is respectfully requested.

***Claim Rejection under 35 U.S.C. § 112, first paragraph***

Claims 10 and 21 have been rejected under 35 U.S.C. § 112, first paragraph, for failure to comply with the written description requirement.

According to the Examiner, the language of claim 10 "obtaining titanium dioxide particles having anatase phase" at the recited conditions is inconsistent with Examples 1 and 2 of the Specification.

First, Applicants have amended the Specification to clarify that Example 1 is a comparative example, i.e., it does not embody the claimed invention. The Specification states that "Example 1 illustrates the vapor phase hydrolysis of  $[TiCl_4]$  and water without any dopant to synthesize titania nanopowders having the [rutile] phase." (Specification, page 8, lines 23-24; emphasis added.) Meanwhile, the present invention is directed to vapor phase hydrolysis with a

dopant. (See Specification, page 1, lines 5-6; claim 1.) Thus, “Example 1” is not germane to the scope of the present invention.

In response to the rejection, claim 10 has been amended to remove the unnecessary functional language related to the phase of the titanium dioxide particles obtained.

The Examiner also contends that the language of claim 21 “hydrolyzing ... under non-isothermal conditions at [a] temperature in the range [of] 80 to 135°C” is inconsistent with the Examples because they disclose an exit gas stream temperature of 137°C. Claim 21 has been amended to specify hydrolysis in the temperature range of 80 to 137°C.

Accordingly, claims 10 and 21 as amended are supported by the disclosure and comply with the written description requirement. Applicants respectfully request that the rejection be withdrawn.

***Claim Rejection under 35 U.S.C. § 103***

Claims 1 and 3-6 have been rejected under 35 U.S.C. § 103(a) as obvious over US 4,574,078 (“the ‘078 patent”) in view of Ahonen et al. and Rubio et al. Claims 1, 7-9, 11, and 15-18 have been rejected under 35 U.S.C. § 103(a) as obvious over US 5,698,177 (“the ‘177 patent”) in view of Richard et al. and Xia et al. Claims 1, 12-14, and 19 have been rejected under 35 U.S.C. § 103(a) as obvious over US 1,931,380 (“the ‘380 patent”) in view of Wegner et al. and Richard et al. According to the Examiner, the references collectively teach a process for hydrolyzing  $\text{TiCl}_4$  in an aerosol reactor in the presence of a dopant and calcinating the product.

In response, Applicants have amended claim 1 to specify the calcination temperature and time ranges of amorphous particles called for in claim 2. Because the cited references do not teach or suggest these limitations, amended claim 1 is not obvious over these combinations of references.

Claims 1-2, 10, and 21 have been rejected as obvious over US 4,241,042 (“the ‘042 patent”) in view of US 5,846,511 (“the ‘511 patent”) and US 1,931,380 (“the ‘380 patent”). The

Examiner asserts that the '042 patent teaches a method for preparing titanium dioxide through vapor phase hydrolysis of titanium tetrachloride and water. The Examiner concedes that the '042 patent does not disclose the use of a dopant, performs heating outside the claimed temperature range, and does not specify crystalline shape. However, the Examiner contends that the '511 patent teaches the use of a dopant and the references collectively show calcination temperature to be a result-effective variable, which one skilled in the art would have varied to obtain the desired results. The Examiner concludes that it would have been obvious to add a dopant in order to reduce particle size and calcination temperature and to vary the calcination temperature to obtain beneficial results.

The '511 patent only suggests that particle shape, size, and size distribution may be affected by the water-alcohol ratio. (*See* col. 4, lines 55-58; *see also* col. 4, line 59 to col. 5, line 18; Examples 1-5.) It does not teach or suggest that alcohol affects the properties of the particles in such a way to vary the calcination temperature of the particles. Accordingly, the skilled artisan would not have been motivated to add a dopant in order to reduce calcination temperature.

Moreover, Applicants surprisingly discovered that the use of a dopant allowed for reduced calcination temperature and time when compared to the prior art. (*See* Specification, page 11, lines 4-22; Examples 1 and 2.) As noted, the prior art does not suggest that a dopant, such as alcohol, may affect calcination temperature. Therefore, the improvements obtained by Applicants' process was unexpected.

Accordingly, it would not have been obvious to combine the references in the manner suggested by the Examiner to reach the present invention. Reconsideration and withdrawal of the rejection is respectfully requested.

## CONCLUSION

In view of the above amendments and remarks, Applicants believe the pending application is in condition for allowance.

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Respectfully submitted,

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